The role of information and behavioral biases in consumer choice for climate friendly proteins

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Abstract

The transition from animal towards alternative proteins can help reduce the negative impact of the food systems on the environment and human health. To promote healthier and more sustainable food systems, consumers around the world are encouraged to explore alternative diets and switch towards more environment-friendly protein sources. However, development of environmentally friendlier and healthier protein sources that consumers will accept introduces a challenge as factors influencing consumer acceptance of alternative proteins remain unclear.

In two studies, the present work evaluates the role of information and behavioral biases in food choices of young consumers for climate friendly proteins. Data were collected by the means of implementing the tools of experimental economics. The revealed findings of the first study indicate that it is hard to convince younger consumers (pupils) to try a novel climate friendly protein product regardless of whether or not they were provided with information about health or environmental benefits. Nevertheless, when asked to state the price beliefs of the novel product, the children mostly indicated higher price for the climate friendly product as compared to its conventional alternative, which in turn indicates higher value assigned to the product.

The second study analyzed the effect of behavioral biases on consumer food choice and how it reflects on the WTA-WTP disparity. The results are in line with academic literature implying that the disparity is present and subject to the substitution effect. Moreover, it was found that consumers value locally produced products more than conventionally produced products by stating average WTP premiums of up to 6.5 and 8.5 SEK for locally manufactured tofu and rapeseed oil.

Keywords: sustainable consumption, climate friendly food, legume-based proteins, willingness to pay, willingness to accept, WTA-WTP disparity

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Abbreviations

BDM	Becker-DeGroot-Marschak
CV	Contingent Valuation
OLS	Ordinary Least Square
PC	Payment Card
RP	Revealed Preference
SLU	Swedish University of Agricultural Sciences
SP	Stated Preference
WTA	Willingness to Accept
WTP	Willingness to Pay

1. Introduction

1.1. Background

In recent years, there has been a rapid growth in the alternative-proteins market which has been related to the increasing consumer interest in health as well as concerns for the environment and a nimal welfare (Bashi, et al., 2019). Another reason for transitioning toward eating non-animal-sourced protein products is the forecasted gap in global protein availability to meet the needs of the rapidly growing population (Henchion, et al., 2017). Moreover, the recent COVID-19 and African Swine flu (2019) pandemics have also been linked to the increasing demand for alternative protein sources due to the risk of disease from animal-based products and concerns around food safety (Attwood & Hajat, 2020). As compared to 2019, sales of meat substitutes more than doubled in the U.S. during the COVID-19 pandemic (Terazono & Meyer, 2020).

The transition from animal-sourced proteins towards alternative proteins can help to reduce the negative impact of the food systems on the environment (Poore & Nemecek, 2018) and human health (Willett, et al., 2019). However, despite these concerns, global animal-based protein consumption continues to steadily increase over the past three decades (FAO, 2020; Hartmann & Siegrist, 2017). Indeed, in many countries, unbalanced diets are considered the main factors for diet-related chronic non-communicable health problems such as obesity, diabetes, and/or cardiovascular diseases that lower global life expectancies (Willett, et al., 2019). Moreover, food production is a significant contributor to climate change due to substantial use of energy, water and land and responsible for more than 25 percent of the world's greenhouse gas emissions (Tso, et al., 2020). With the world's population predicted to reach 10 billion by 2050 coupled with increasing affluence in low- to medium-income countries, the linked dietary trends and unsustainable consumption behavior are estimated to increase the environmental impact of global food systems by 50 to 90 percent (Tso, et al., 2020), which can be seen as a more critical question than potential protein gap.

Dietary choices are considered to be the major global determinants of public health and environmental sustainability and can threaten the achievement of the UN's Sustainable Development Goals and the Paris Climate Agreement. The implementation of food consumption solutions to the Food-Planet-Health trilemma and encouragement of sustainable consumption towards developing environmentally friendlier society have become one of the major political, economic and sociological challenges worldwide. In order to promote healthier and more sustainable food systems, consumers around the world are encouraged to explore alternative diets and switch towards more environment-friendly protein sources (Springmann, et al., 2018). Sustainable consumption, which is introduced as the use of goods and services that satisfy basic needs and improve life quality while minimizing the use of nonrenewable natural resources and by-products, does not necessarily imply less consumption, rather it is about consuming differently and more effectively from social and environmental perspective (Springmann, et al., 2018). The EAT-Lancet Commission on Food, Planet, Health defined ambitious sustainable diets for different regions of the world in order to transform global food systems and achieve planetary health diets[1] for nearly 10 billion people by 2050 (Commission, 2018). The commission's diet recommendations include (1) low amount of animal-based protein sources, (2) reduction in consumption of refined grains, processed products and added sugars, (3) increase in the consumption of fruits, vegetables, legumes, and nuts.

In this context, a variety of goods affiliated with characteristics such as environmental and health benefits has emerged in markets, such as organic produce, local produce and animal protein alternatives like vegetal sources of protein that include cereals and legumes (e.g., tofu, tempeh), algal protein (seaweed, Spirulina and Chlorella), insect protein, and/or invitro/cultured meat protein. This development of eco-friendly goods can imply that these attributes of products affect food choice decisions. Today, given the advances in food production technology and food systems' globalization, consumers are introduced to a larger variety of protein sources in the market and more options to choose from. This in turn puts consumers in the position to consider different product characteristics such as price, health benefits, environmental and/or safety aspects, ethical concerns, etc., as critical factors affecting food choices. However, the relative influence of these factors driving sustainable consumption behavior remains unclear.

[1] The planetary health concept was put forth by the Rockefeller Foundation-Lancet Commission and refers to the "*health of human civilization and the state of the natural systems on which it depends*". The EAT-*Lancet* Commission builds upon the concept and present a term "planetary health diet" to highlight the role of diets in human health and environment and the need to integrate these agendas into a common agenda for transformation of food systems to achieve SDG and Paris Agreement.

1.2. Problem statement

Despite the recent increase in global interest in alternative proteins, there is mixed evidence regarding the key drivers of alternative proteins consumption (Tso, et al., 2020). Consumer acceptance of novel food products like plant-based meat alternatives is complex and can be influenced by a number of factors, such as economic factors, psychological situational and/or emotional factors, food neophobia, different products' characteristics and attributes, sensory appeal and taste, health and ethical concerns. Product label information could also affect and bias consumers' perceptions. Studies show a positive effect on consumer acceptance when provided with information about environmental benefits and assured safety of alternative proteins like insect-based products (Schouteten, et al., 2016). Moreover, socio-cultural factors can play significant role in reduced animal protein consumption. While alternative proteins are widely consumed in parts of Africa, South America and Asia, Western diets are characterized by higher proportion of animal protein consumption (Hartmann & Siegrist, 2017). Another factor that can affect consumer alternative proteins consumptions could be the rising consumer mistrust of food producers and product quality and safety aspects. Recent COVID-19 and African Swine flu pandemics increased consumers' concerns about disease risks and food authenticity (Terazono & Meyer, 2020). Consumers tend to trust more farmers and local producers and less multinational manufacturers due to questioned transparency of these multinational producers in their food production practices (TrustTracker, 2020). Furthermore, findings from behavioral economics, indicate that people regularly and in a predictable way behave irrationally in a way that contradict standard assumptions of economic theory and recognition of behavioral biases that influence consumers' food choice decisions is of importance.

Although health and environmental concerns are often cited by consumers as some of the main reasons that results in demand for alternative proteins, research shows that only minority of consumers are aware of and motivated by "healthiness" and "environmental friendliness" in their actual pro-environmental food choices and in the desire to reduce animal protein consumption (Weinrich, 2019). A recent systematic review of more than 30 studies by Hartmann and Siegrist (2017) showed that only approximately 13 to 26 percent of consumers motivated their reduction in animal sourced protein intake for environmental reasons.

On the other hand, a strong consumers' interest in obtaining more information about the food they eat led the food industry to use the provision of information as an instrument in order to differentiate products, segment consumer demand as well as appreciate prices above marginal costs. As a result, marketing efforts have moved from food products' promotion to the promotion of food attributes in terms of what a food product contains as well as how and where it is produced and manufactured (Hartmann & Siegrist, 2017). As the provision of information on food attributes continues to grow, understanding how consumers evaluate the information in their purchase decisions has become complex. The present study highlights significant gaps in the available evidence, that support the factors influencing consumer acceptance of alternative climate-friendly protein sources and it remains unclear

which factors will support the transition of global market towards healthier and more sustainable food systems.

Developing environmentally friendlier and healthier substitutes to animal-based protein sources that consumers will accept introduces a challenge and highlights the importance of conducting studies in which researchers introduce consumers with alternative proteins to the conventional products and evaluate consumers' responses (Hartmann & Siegrist, 2017). Little is known about the value consumers place on the environmental characteristics and attributes of climate-friendly products and there is a need for firms to assess and evaluate the importance of this valuation among the bundle of product attributes, so they can design the right policy or launch the right product in the market. Moreover, it is critical for industries that consider the development of eco-friendly products to assess how consumers choose products with environmental characteristics and how much they are willing to pay for such products and whether behavioral biases affect their choices, which allows measuring the feasibility of the product in the market.

The present paper focuses primarily on the health, environmental, and safety concerns to be the main motives of consumers to opt for alternative climate-friendly foods with perceptions that such foods are healthier, safer and better for environment. Another focus is on the presence of behavioral biases in consumer food choice for climate-friendly protein products.

1.3. Objectives and Research questions

In two studies, the present work aims to contribute to an increased understanding of how consumers make food choices and what factors affect their decision. Accordingly, the objectives of the present study are two-fold: (1) to determine the role of information in consumer choice for climate friendly alternative proteins; (2) to determine the role of behavioral biases in consumer food choice through the analysis of the willingness-to-pay/willingness-to-accept (WTA-WTP) disparity.

The thesis is aimed to appreciate the impact of the health benefits and environmental characteristics of a given product on consumers' food choice. Traditional economic analysis assumes that individuals order various product options available and chooses the option that provides the greatest utility or satisfaction. Such behavior to compare various goods suggests that consumers allocate a value to each product in their choice set and evaluation of this choice is central to the examination of consumption mechanisms as the value of a product is seen as the values aggregation of a bundle of characteristics. It is critical to understand how consumers determine the value of a good associated with the values of its characteristics. Consumers' food choices can be affected by information and result in consumers' knowledge change, shaping their attitudes and redirecting decision making in terms of food choices and dietary behavior. Thus, the provision of information on the environmental and health aspects of alternative proteins can increase consumer acceptance of the products. The first study investigates whether participants provided with food-related health and environmental benefits

information choose these types of environment-friendly products. Specifically, the following research question is discussed:

- *What is the role of different types of information in consumer choice for climate-friendly food products?*

Furthermore, the study looks into how the information provided can result in certain price beliefs of the given product, which allows assessment of consumer product valuation or the worth of the product. To answer this question a field study has been conducted among school children to evaluate their acceptance of a novel environmentally friendly snack and assess how the information provision can influence children's price beliefs of the given snack as compared to the familiar conventional snack. Children's health, nutrition and food consumption behavior are affected early in life by the eating habits which shape food attitudes and eating patterns through adulthood. In this regard, it is of particular interest to investigate the role of information on food choices among children. It is interesting to study whether information provision of a novel product's health and environmental characteristics raise interest in the product among children and how it will reflect on the value assigned to the good through children's price beliefs, which in turn allows to measure the feasibility of the product in the market and elucidate the attitudes towards a novel product among younger consumers.

Another factor that can affect consumer choices is related to the behavioral biases. In contrast to the welfare economic theory, empirical literature indicates that the amount of money consumers are willing to accept (WTA) in order to forsake a certain commodity will normally exceed the amount of money they are willing to pay (WTP) to get the same commodity (Horowitz & McConnell, 2002; Hanemann, 1999). To better understand the behavioral biases, in particular the "home" bias, in consumer food choices the following question is discussed:

- *What is the effect of "home" bias in consumer choice for climate-friendly food products?*

The second study undertakes a survey-experimental evaluation of the WTA-WTP gap and "home" bias using food products manufactured either in Sweden or outside of Sweden. The survey was conducted among students from Swedish University of Agricultural Sciences (SLU). Furthermore, the study investigates the variances between consumers based on individual latent traits and socio-demographic characteristics, in order to assess how these factors affect WTP and WTA and to outline a profile of target consumers attracted by climate-friendly products. Similar to the previous study, the focus here is on young consumers. The motivation behind studying young consumers is that they can be valued as key stakeholders in the conceptualization of sustainable living and sustainable food consumption (Bentley, et al., 2004) providing that they represent future consumers and future of the society. Moreover, decisions of students that took part in the online auction experiment were self-catering and consumers of products considered in the study.

1.4. Study outline

The remainder of the thesis is organized as follows. Section 2 provides an overview of the existing literature concerning earlier research on the role of different factors affecting consumer food choice including the role of information and behavioral biases. This is followed by Section 3 presenting the theoretical framework of the study followed by the methodology of the research in Section 4. Section 5 outlines the materials and methods used and applied in the present study as well as the experimental design and hypotheses stated. The findings and discussion of results are presented in Section 6, followed by the conclusions, study limitations and future research recommendations provided in Section 7.

2. Literature review

The amount and type of information can influence stated preferences as well as validity of the estimated values (Blomquist & Whitehead, 1998). A number of studies has been conducted since the late 1980s in order to examine how the type and amount of information affects SPs. Hoevenagel and van der Linden (1993) studied whether different descriptions of the ecological goods result in different values. By conducting a field experiment to study the effects of three descriptions of a good, Hoevenagel and van der Linden (1993) found significant effect of the information provided on WTP values. While large differences in good's description showed large effects on WTP, smaller differences resulted in negligible effects.

Moreover, differing degrees of subjects' experience and understanding reflects on significantly differing levels of WTP as shown by Cameron and Englin (1997). Their research results suggested higher effects of the information for goods for which subjects did not have prior experience or fimiliarity. In such cases, positive information with an emphasis on desirable product attributes positively impacted stated preferences for that good (Bergstrom, et al., 1989; Munro & Hanley, 2002). By the same logic, information effects are likely to be minor if subjects are highly familier with a good and information about desirable characteristics of its substitudes result in lower stated preferences for the good in question (Whitehead & Blomquist, 1991; Cameron & Englin, 1997). Bateman and Mawby (2004) studied how changes in the level and type of information for an environmental good impacts consumers' stated WTP. The authors observed that additional information, particularly concerning the less familiar aspects of a good resulted in higher stated value estimates of the respondents.

Ajzen, et al. (1996) conducted a laboratory experiment to examine the potential of information bias in the CV studies. The authors assessed WTP for both public and private goods as well as attitudes of subjects towards the goods in question. In addition to WTP evaluation, attitudes, subjective norms, perceptions of behavioral control and behavioral intentions were also taken into consideration. The study results showed that an increase in the quality of arguments (strong arguments as opposed to weak arguments) in the description of a good can function as persuasive message, produce positive attitudes and reflect in subjects' increased WTP for the good. It was found that the nature of the information provided in CV studies significantly affect stated WTP estimates. Their results were in line with findings of Czajkowski, et al. (2016) and Yang and Hobbs (2020).

Czajkowski, et al. (2016) by developing a reduced form method of controlling for differences in information sets of respondents in public good discrete choice experiment using SP techniques found significant impact of different information sets that led to differing stated preferences. Yang and Hobbs (2020) explored information framing effects by comparing the usefulness of implementing logical-scientific as compared to narrative information to communicate with study respondents about a novel food product and its attributes. By conducting a discrete choice experiment among Canadian adults, the authors found the importance of the information format in the choice behavior.

For the provided review, it can be concluded that presence or absence of information effects can be affected by the type of product/service and its attributes taken into consideration, different characteristics of respondents as well as information characteristics of different study applications.

2.1. The role of product attributes in food choice

From the theoretical and rational economic choice point of view, individuals seek to maximize their utility when making consumption decision. The utility of consumers is derived from both material (price of a good/service) and non-material sources (product/service attributes such as health and environmental benefits) (Frey, 1997). Therefore, consumers' concern about food safety and trust in food manufacturers can be considered as a significant non-material driver of consumers' choice of local foods. Moreover, literature identifies other non-material factors/attributes explaining choice of local products, such as quality, freshness, healthiness and taste (Bond et al., 2008; Cranfield et al., 2012; Onozaka and McFadden, 2011; Pearson et al., 2011; Yue and Tong, 2009). Yue and Tong (2009) found that consumers buy locally produced products to support local economy and farmers (Burchardi et al.,2005; Roininen et al., 2006; Yue and Tong, 2009) as well as due to perception that local food is more environmentally friendly given the short transportation distance (Zepeda and Li, 2006). In this context, providing that a product's success on the market is greatly dependent on consumer product acceptance, the question arises whether locally manufactured products affect food choice decision.

On the other hand, a number of consumer studies have been conducted in order to understand the role of information about products health benefits and positive environmental characteristics in food choices consumers make. Vecchio and Annunziata (2015) by the means of using experimental auction approach in Italy, evaluated young consumer attitudes to sustainable food and analyzed the determinants of their stated WTP for chocolate bars with different sustainability labels (Fair Trade, Rainforest Alliance and Carbon Footprint). Econometric results of their study revealed positive and significant effects on WTP by the socio-demographic factors, such as age (older), gender (female) and household income (higher). Subjects' lifestyle and food consumption habits also showed a positive effect on WTP.

Hoek, et al. (2017) investigated the effect of point-of-purchase actions, price changes, health and/or environment logos, health and/or environment product information labels. The authors conducted three hypothetical choice experiments and assessed choices between standard products and their healthy and sustainable food alternatives via use of online survey study of a sample of Australian household grocery buyers. The results showed that the effects of different factors were product and consumer segment dependent. The similarity between two alternative products played important role in food choices and consumer responsiveness was influenced by the familiarity with the healthy and environmentally friendly food alternative.

In their study, Lombardi, et al. (2019) investigated the effect of different types of information on consumer choices and tested the main drivers of consumer preferences for insect-based food products. 200 Italian consumers' preferences for insect-based pasta, cookies and chocolate bars were analyzed through a non-hypothetical WTP elicitation mechanism. Their research showed that different insect-based products generate different results in terms of WTP for conventional and insect-based product versions. When information regarding the health and environmental benefits of insect consumption is provided, it positively affects consumers' WTP for the insect-based products.

Van Loo, et al. (2020) conducted a nation wide choice experiment of more than 1800 U.S. consumers in which respondents were asked to choose from conventional beef and three alternative burger patties (lab-grown and two different plant-based) at different prices and with a presence/absence of brands and information about the alternatives to the conventional product. Their results showed that holding prices constant, conventional beef maintained the majority market share. Adding inforamtion about brands or environmental and technology information had minor effects on the respondents' choice of alternative meat. However, environmental and technology information reduced the share of people that did not choose any option, which in turn could signify that information pulled more people into the market.

On the other hand, the recent study of Manohar, et al. (2021) examined the role of unfamiliarity and information on health benefits and taste expectations on willingness to try unfamiliar healthy foods among males and females by controlling for the influence of food neophobia and health consciousness. Their findings showed that the health benefits information and taste expectations did not result in main effects on willingness to try new healty foods. While unfamiliarity type had no effect on males, females indicated the importance of trying a novel healthy product.

2.2. WTA-WTP disparity

Empirical evidence of numerous experimental and contingent valuation studies shows that the WTP to obtain a good is significantly smaller than the WTA compensation to forsake it. This significant divergence exceeds the difference predicted by the standard utility maximization theory (Horowitz & McConnell, 2002; Kahneman, et al., 1991). Several explanations have been provided by the

academic literature. Kahneman, et al. (1990) proposed the endowment effect related to loss aversion of individuals, whereby choices are seen as gains and losses and that losses have a larger impact than gains. Hanemann (1991) on the other side offered another explanation to the WTA-WTP disparity. His argument of why the value divergence occurs is the presence of both income and substitution effects. The greater available substitutes of a good the smaller is the difference between WTA and WTP. To test Hanemann's (1991) proposition, Shogren, et al. (1994) conducted nonhypothetical experimental auctionsof both market (candy bar and brand-name candy bar) and non-market goods (test product with a chance of being contaminated with a food-borne pathogen and stringently screened food with low probability of causing food-borne illness). The revealed results of the auctions confirmed Hanemann's explanation of WTA-WTP gap that is drived by the degree of substitutability of a given good. The WTA and WTP measures of market good value with high degree of substitution were not significantly different, while significant divergence was present for the non-market good.

Boyce, et al. (1992) argued that the WTA-WTP disparity is linked to product's/service intrinsic values. To test their hypothesis, the authors conducted an experiment where four conditions were compared. In the first set of conditions subjects were asked how much they are WTP in order to purchase a small pine tree or they were asked to state their WTA to sell the tree back to experimenter. Two analogous conditions yet with added intrinsic value also were introduced. The added intrinsic value was introduced by the kill scenario condition where the given tree would be killed if subjects either didn't buy or sell the tree back. The results of both the kill and no-kill conditions, WTA was higher that WTP, while in the kill scenario the disparity was larger. Boyce, et al. (1992) explained the revealed greater WTA-WTP gap in the kill scenario by considering moral responsibity of respondents as an intrinsic value. As subjects assigned to the WTA kill scenario (sellers) held the property rights of the trees and could view themselves as responsible for the death of the tree they stated higher WTA amounts. Respondents in the WTP kill scenario (buyers) did not hold property rights and did not consider themselve as responsible at least partially of the tree, thus showed lower WTP measures.

Following the study of Boyce, et al. (1992) , Anderson, et al. (2000) undertook an experimental examination of the WTA-WTP gap by the means of using conventional and ecological eggs. The moral dimention in the study was provided by the welfare of hens producing ecological eggs and quality of the environment. Their results revealed that the disparity is negligible for conventional eggs, while the mean of WTA is more than 1.5 times higher than the mean WTP for organic eggs and the explanation for the results was given by the presence of product intrinsic value (organic attribute) and degree of moral responsibilty.

Georgantzis & Navarro-Martinez (2010) conducted an experiment to study the psychological basis for the WTA-WTP disparity with bottles of wine and introduced five additional instruments in order to follow the psychological constructs of the subjects: attitudes, feelings, familiarity with the target product, risk attitudes, and personality. Their study results showed the psychological complexity of the WTA-WTP disparity. The attitude changes are not a necessary

condition for the disparity to appear. As for the feelings regarding product owning, subjects showed positive feelings for owning the product which significantly affected the WTA-WTP gap. The familiarity and risk attitudes of the subjects indicated the strong support for the theoretical explanation of the WTA-WTP disparity due to loss aversion. The subjects' personality profiles were significantly correlated with the monetary valuations of wine which introduces a whole new dimention of WTA-WTP gap. The authors found that different personality factors were associated with different monetary valuations which changed with endowment.

Drichoutis, et al. (2016) conducted a field valuation experiment to determine whether consumers place a positive value on climate neutral food products and tested whther WTA-WTP disparity can be influenced by different methodological choices. Specifically, they compared results of contingent valuation to inferred valuation method, two types of elicitation formats: dichotomous choice and payment card elicitations. Their findings indicated that WTA-WTP gap was similar across valuations elicited with contongent and inferred valuation, while payment card elicitation format muted the disparity between measures.

3. Theoretical framework

Stated preference (SP) survey techniques are frequently implemented as market research tools that allow to examine and understand how consumers value different product/service attributes by asking subjects to rank, rate or choose between different product/service alternatives with different attribute mixes in order to infer the preference elicitation. The technique has evolved within the field of utility theory. The origins of the utility theory are traced to the utilitarianism philosophy dating back to Bentham's concept of utility defined in hedonic terms and the provided pleasure, while others referred to utility as "wantability" (Heap, et al., 1992). Researchers within the field of utility theory tried to find methods to measure individuals' utility in order to determine consumer preferences by conducting experiments using hypothetical choice based on the revealed preference data (Thurstone, 1931; Rousseas & Hart, 1951).

3.1. Revealed Preference Theory

Samuelson (1938) first introduced the term revealed preference (RP) suggesting that individuals' behavior reflects on their choices where preferences (utility) can be inferred. The theory of revealed preference has been developed and expanded for the estimation of choice models, where revealed preference data is obtained through direct observations of actual behavior. The theory asserts that in order to measure consumer preferences, their purchasing behavior needs to be observed and analyzed. RP theory is based on rationality of consumers that consider a set of alternatives before making an actual purchase decision of the option that is preferred the most. Another assumption of the RP theory is that a preference remains unchanged over time. This assumption has been criticized as an action at a specific point in time can reveal individual's preference only at that time. There is no proof that the preference remains constant over time. Moreover, providing that in real world individuals are introduced to a variety of alternative choices, it is difficult to determine what products/services were turned down in the preference of a particular product/service choice.

3.2. Stated Preference studies

SP techniques have been developed for understanding consumer preferences as alternative methods to RP studies. The method implies provision of information on the good to be valued and evaluation of how consumers value different product/service characteristics (Abley, 2000). Before 1980s the emphasis of the SP studies was on tasks that required consumers to rate or rank a variety of characteristics within a certain choice scenario. However, SP techniques become widely recognized after the article by Louviere and Hensher (1983) that highlighted the use of SP method incorporating choice experiments. The results obtained through the SP techniques was easy to analyze and allowed for better market share predictions. Although these research tools substantially grew in their application, some researchers remain skeptical and question whether subjects' stated intentions result in actual behavior (Abley, 2000). While the implementation of SP methods has become common, it remains unclear how consumers make choices in experiments. The main assumptions that are based on economic theory in which the methods were established are questionable due to findings that showed subjects' irrational choice behavior (Abley, 2000; Ampt, et al., 1995).

3.3. Alternative Theories of Decision Making

The emergence of behaviorism introduced alternative explanations to previous cognitive approaches to consumer behavior. Behaviorists see behavior as a result of reflexes to external stimuli rather than the influence of cognitive mind in guiding decisions that is irrelevant in predicting consumers' choice behavior. The model presented by Pearmain, et al. (1991) proposes the influence of Fishbein's theory of decision making originating from the field of psychology. According to the model by Pearmain, et al. (1991), two distinc elements affect consumer decisions: external observable elements (perceptions/beliefs, attitudes, preferences and behavioral intentions) and internal unobservable elements (socioeconomic characteristics, product/service attributes, individual's situational constraints, alternatives availability constraints, behavior). Their model suggests that by implementation of quantitative methods such as SP techniques, the data on preferences and behavioral intentions can be obtained and inferred.

There is an important difference in the definition of the concept "rational behavior" between field of economics and psychology. While in economics, rationality is evaluated by the choices/decisions made (substantive/subjective/instrumental rationality), in psychology it is examined by the terms of the processes employed (procedural rationality) (Simon, 1996). The former assumes full information availability, while the latter assumes that choices are founded on a distorted data availability.

Substantial attention within marketing research has been paid to consumers' level of involvement with product/service under choice consideration. According to Foxall (1983), the level of consumer involvement that relies on product/service

complexity, risk and cost, affects consumers' motivation to participate in the full information processing resulting in selective perception and screening processes of the provided information (Timmermans, 1993).

The key to the alternative theory of rationality is the procedural theory that proposes that consumers' "rule of thumb" guides their decisions. The use of "rules of thumb" were viewed by Simon (1996) as short-cut devices for decision-making, where given the limited information about product and presence of bounded rationality, consumers satisfice rather than optimise.

3.4. The role of information on food choice

The standard economic theory suggests that individuals maximize their utility given the perfect information and market competition. There are three major factors identified by the theory affecting consumption: price, income and personal tastes or preferences. As the realm of traditional economics analysis is restricted to the role of former two factors in determining consumption choices, the personal tastes or preferences are typically taken as exogeneous. On the other hand, the demand theory proposes two other main assumptions where a consumer is driven by his/her own interest and the desires are not satiable. In this theoretical context individuals seek to maximize their utility subject to budget constraint. Moreover, the theory assumes that individuals obtain perfect information about the available alternatives.

A more elaborate theory is needed to understand sustainable consumption as it can be difficult to explain the evolution of consumption with the existing utility theory focused on the formal properties of utility functions instead of consumers' objects of preferences (Witt, 2001). The new approach to the consumer theory by Lancaster (1966), the characteristics demand theory, identifies consumers as market actors who create their utility within the household context and the main assumption is that goods and services are inputs of the consumption process, where individuals derive their utility from product characteristics instead of product itself. In other words, product attributes or characteristics are relevant in consumer choices. The innovation of this approach is the introduction of relationship between a good and its characteristics and decomposition of choice process based on this relationship. The availability of products with various attributes complexify the consumer decision making as concepts of bounded rationality, imperfect information and cognitive biases imply that individuals are inefficient in their choices and neoclassical economics fails to explain different consumption behaviors (Simon, 1955). The main question is *how* a choice is made rather than which choice is made.

One of the areas of decision-making research is about how people assess multi-characteristics alternatives and consequently make a preferential choice. According to Payne and Bettman (2002), consumers implement a range of decision-making processes in order to solve problems associated with preferential choices. Strategies involving information processing are heuristics as only a subset of potentially relevant information is evaluated. For instance, well-informed consumers tend to concentrate on objective information of product characteristics, while less informed

or novice consumers focus on general information about product category (Bettman & Sujan, 1987). In this sense, consumers can find it difficult to process the environmental quality as well as health benefits characteristics of a product, and clear signals in form of labels on environmental and health dimensions are necessary. Besides, there has been an evidence that consumers trust signals more easily if information is provided by independent and reliable sources (Tso, et al., 2020). Furthermore, the nature of information available at the time of purchasing should be integrated when evaluating the consumption behavior. Such information can be related to the good itself or its production process' environmental impact in order to characterize consumers' behavior heterogeneity to information provided and gain better understanding of the success or failure of private advertising strategies and public certification campaigns.

3.5. Behavioral biases and the WTA-WTP disparity

Economic theory suggests that when the income effects are small and with many available substitutes, the economic value an individual assigns on a good is independent of whether s/he owns it or not (Hanemann, 1991). Yet, as stated previously in the literature review, experimental and contingent valuation studies show that the WTP to obtain a good is significantly smaller than the WTA compensation to forsake it, often referred to as WTA-WTP disparity or WTA-WTP gap. Several explanations have been suggested by the academic literature, such as theoretical explanations like income effects and transaction costs (Randall & Stoll, 1980), the availability of substitutes (Hanemann, 1991; Shogren, et al., 1994), psychological and behavioral reasons such as framing and endowment effects (Tversky & Kahneman, 1991; Thaler, 1980) as well as issues related to experimental design and elicitation formats (Plott & Zeiler, 2007).

The most widely used psychological explanation for the WTA-WTP disparity is the Prospect theory and the idea of loss aversion and further application of the endowment effect (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991; Tversky & Kahneman, 1992). Kahneman and Tversky (1979) offered theoretical explanation which is based on reference dependent preferences: individuals make decisions based on potential gains and losses relative to the reference point. Their proposed value function that passes through the reference point where the carriers of utility represent changes in wealth is s-shaped and asymmetrical (please refer to Figure 1). It is concave for gains but convex for losses implying that losses outweigh gains; given the same variation in absolute value, there is a smaller impact of gains, than of losses (loss aversion).

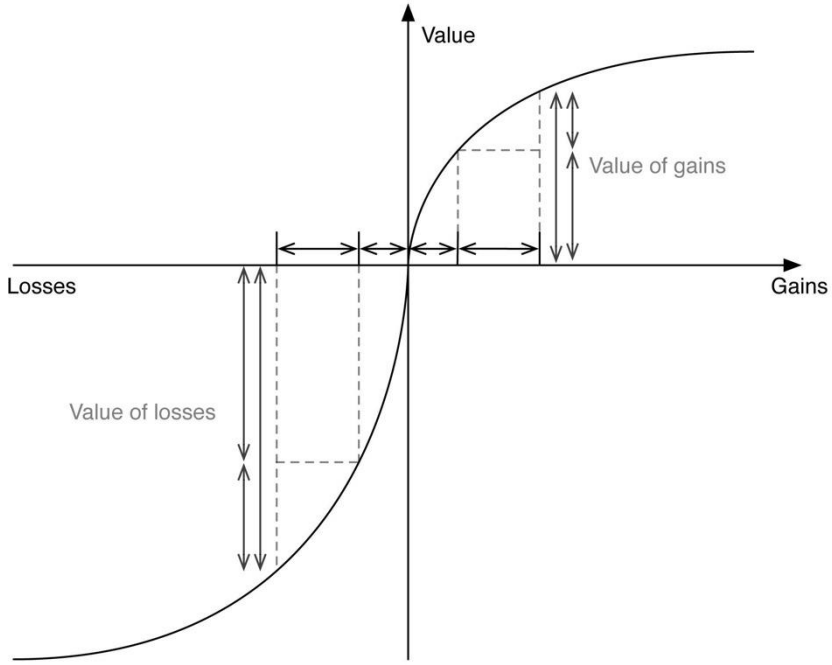

Figure 1: The value function of the Prospect Theory
by Rosenberger (CC BY-SA 4.0)

Later, in 1980, Thaler coined the concept of endowment effect. When an individual is endowed with a certain object, s/he values it more than if not endowed. Endowment can enhance the value an individual attaches to a good s/he owns, which in turn can be reflected in WTA and demand for higher compensation to forego the owned good than WTP to gain the same good. Here, the endowment effect is considered as a facet of loss-aversion, which in turn violates the standard economic theory asserting that there will be no or negligible differences between WTP and WTA measures, the underlying hypothesis of the consumer theory and indifference curves.

4. Methodology

This study follows quantitative research with a deductive theory approach. The reason behind the methodology is that the quantitative research enables the measurement of different phenomena and allows the researcher to draw generalizable knowledge and conclusions for the population using data from selected sample (Bryman & Bell, 2015). The chosen methodology emphasizes objective measurements, focuses on gathering numerical data using structured research instruments aiming to construct statistical models in an attempt to explain what is observed. Quantitative research approach enables scientific replication which in turn provides quality assurance of the research and reliability of the results obtained. It allows to test and verify theories and explanations, identify and evaluate variables in question and hypotheses by the means of using validity and reliability standards, observing and measuring information numerically and implementing unbiased approaches and using statistical procedures (Bryman & Bell, 2015).

The ontological assumptions for the study were based on methodological individualism and objectivism that emphasizes the awareness of social actors of the objective reality where knowledge can be proven by various measurements and provides reliability and external validity of the research results (Bryman & Bell, 2015). As for the epistemological assumptions, they are of the positivism approach that is often applied to social sciences. Positivism assumes that the world is external and that there is a single objective reality to any research phenomenon regardless of researcher's perspective which results in research objectivity and use of consistently rational and logical research approaches (Bryman & Bell, 2015). Providing that the purpose of theory is to determine hypotheses which then are tested, the deductive research approach was implemented.

5. Materials and Methods

To respond to research objectives and answer the research questions, the tools of experimental economics were employed. This section details the sampling and study designs, the products used in each study, the elicitation methods and information provided as well as post-experiment data collection. Moreover, the section presents the hypotheses tested by the conducted experiments. The data obtained from both studies can be considered as a complement to the market data which reflect behaviors in much more complex informational context where variety of factors can influence consumer decisions. The main interest of the present paper lies in preferences for the environmental attributes of food products and behavioral biases in their food choices. The behavioral biases were analyzed by the means of measuring the WTA-WTP gap for locally and non-locally manufactured products. Given that market data related to the preference information about green products is mixed due to the fact that such products are still on niche markets, experimental economics allows to gain insights related to value elicitation of consumers in food choice decision-making process.

5.1. Study 1 – the role of information in consumer food choices

5.1.1. Experimental design

Taking into consideration the importance of information in consumers' choices, the study intended to observe behaviors in a controlled information environment. This can be achieved with the tools of experimental economics. A real choice experiment was conducted in the field environment in Uppsala, Sweden during SciFest, a three-day annual science festival that covers disciplines from natural science, medicine, technology to social sciences. Every year, teachers, students and general public were invited to the festival to experience some hands-on research and science with the aim of increasing interest in learning more about different subjects. The experiment was conducted during 5th and 6th of March 2020.

Participants were approached during the SciFest and asked whether they are interested in participating in the research where they have an opportunity to choose between two snacks and complete a short series of questions. Then, if visitor agreed,

s/he was provided with a consent form to sign (please refer to Appendix A). The participants were introduced to two types of snacks:

- novel legume-based snack - roasted and salted Edamame beans; and
- common conventional snack - salted sticks.

The between-subjects design was implemented with two different treatments and a base group. Participants interested in the study were asked to make a choice between two snacks. All SciFest visitors and/or potential study participants were shown both types of snacks for visual evaluation and they could also taste the Edamame beans snack. a total of 286 students participated in the study. The control group (n=96) was given a piece of paper with pictures of both snacks and asked to make a choice between two snacks. The Treatment 1 group (n = 93) was also induced with information about health benefits of the Edamame beans, while Treatment 2 group (n = 97) was provided with information regarding the positive environmental characteristic of the Edamame beans (please refer to Appendix B).

After making the choice between two snacks, the participants completed a short questionnaire regarding their gender, age, and how they describe their diet. They were also to state on a seven-point Likert scale anchored by strongly disagree to strongly agree regarding their knowledge about soybeans before and after participation. Moreover, each participant was asked to identify the approximate price of both snacks in supermarkets. This was done in order to identify whether participants, given the environmental and health benefits attributes of legume-based snack, would value Edamame beans at higher price as compared to conventional snack. Given limited number of snacks available, every 10^{th} participant's decision was binding, and s/he received the product of choice.

5.1.2. Hypotheses

There are two primary hypotheses that were set out before the experiment assessing the role of information on consumer food choice:

- **H_1:** *Information about health or environmental benefits attributes of an environmentally friendly product shift consumer choices towards this product.*

The provision of information about health benefits or environmental benefits of an environmentally friendly product will shift consumer choice towards this product rather than to its conventional alternative.

- **H_2:** *Price beliefs are higher for products with health and environmental benefits attributes than for conventional alternatives.*

Given the presence of health or environmental benefits attributes of an environmentally friendly product, consumer valuation in terms of the price beliefs of this product will be higher than price beliefs of conventional alternative.

5.1.3. Econometric model specification

To analyze the respondents' food choices econometrically, discrete choice model was applied. Since the dependent variable is dichotomous or binary (children either choose Edamame beans or not), the relevant explanatory variables in the field study were identified by the means of implementing a standard logistic regression model (logit model). Logit model is commonly used in the research to analyze choice experiment data and represents non-linear regression model. It is also favored for its mathematical simplicity as its asymptotic characteristic constrains the predicted probabilities to a range of zero to one. The logistic cumulative distribution function and the coefficients are estimated by the method of maximum likelihood. The logit model estimates the probability of the variable of interest given the predictor variables. For the data collected from the choice experiment, the logit model estimates the probability that a subject chooses Edamame beans, given the treatment, his/her gender, age, diet as well as estimated price beliefs of the environmentally friendly snack and its conventional alternative, salted sticks.

The estimated probability that a subject chooses Edamame beans is:

$$\mathrm{P}\ (Edamame\ beans = 1|\mathrm{X}_{1i}, \mathrm{X}_{2i}, \dots, \mathrm{X}_{ki}) = \frac{1}{1 + e^{-Z_i}}$$

where:

$Edamame\ beans$ = 1: when a participant chooses Edamame beans;

$\mathrm{X}_{1i}, \mathrm{X}_{2i}, \dots, \mathrm{X}_{ki}$: explanatory variables for participant i;

$Z_i = \beta_0, \beta_1 \mathrm{X}_{1i}, \beta_2 \mathrm{X}_{2i} + \cdots + \beta_k \mathrm{X}_{ki}$;

$\beta_0, \beta_1, \dots, \beta_k$: coefficients to be estimated.

The description of regression variables identified in the study are shown in the Table 1 below.

Table 1: Description of variables

Variable	Description	Categories
CHOICE	Respondent's choice of snack	0 = salted sticks, 1 = Edamame beans
TREATMENT	Type of treatment implemented	0 = Control group, 1 = Information about health benefits is provided, 2 = Information about environmental benefits is provided
GENDER	Respondent's gender	0 = male, 1 = female, 2 = other
AGE	Respondent's age	in years
DIET	Respondent's diet	1 = flexible, 2 = vegetarian,

		3 = vegan, 4 = other
ESTCOSTB	Respondent's estimated cost of Edamame beans in a supermarket	in SEK
ESTCOSTS	Respondent's estimated cost of salted sticks in a supermarket	in SEK
COSTDIFF	Estimated costs' difference (Estimated cost of Edamame beans *minus* estimated cost of salted sticks)	in SEK
COSTRATIO	The ration of estimated cost of Edamame beans and salted sticks	in SEK

5.2. Study 2 – the role of behavioral biases in consumer food choices

5.2.1. Experimental design

In order to investigate preferences on food products' attributes and to explore and measure the WTA-WTP gap and "home" bias in food choices consumers make, the contingent valuation (CV) was used in form of an online survey conducted using convenience sampling approach. Results obtained through the CV are generally used in valuing the benefits of new products and/or services. While the CV method was essentially implemented in environmental valuation literature where a real market with salient payments is challenging to establish, it has developed considerably in the valuation of food products over time (Corzi, 2007; Buzby, et al., 2003). To respond to research objectives the incentive-compatible Becker-DeGroot-Marschak (BDM) type of auction procedure was applied that involved real transactions (Becker, et al., 1964). In the BDM method participants were asked to provide an offer for the valued good. The offered price is then compared to a randomly drawn fixed price, which is used as the trading price and a participant's dominant strategy is to offer exactly their true value. The main advantages of the BDM are that the single value measurement requires little effort and time for the experimenter as participants are asked to state a single value and the valuation is precise and can be reported up to single cents.

A total of 61 students from the Swedish University of Agricultural Sciences (SLU) agreed to participate in the study. Participants were invited to take part in a research study on food choice via mailing lists. The data collection took place between 4th of January and 25th of January 2021. By following the link, subjects were directed to a webpage hosted by Qualtrics. The opening page provided information about the goals of the study (interest in understanding food choice), expected duration (approximately 15 minutes), compensation (150 SEK in form of an ICA voucher and opportunity to receive a food product), conditions to participate (requirement to provide a valid SLU email address so the participants could be contacted about

the dates when they can pick up their compensation) and ethical considerations (anonymity, confidentiality and the right to withdraw from survey at any point). After participants gave their consent, they were redirected to the survey. Before the main part of the survey (the actual online auction) and in order to ensure respondents' understanding and comprehension of the survey procedure both text and short video instructions were provided followed by the control questions after each instruction. Then, the elicitation of valuations for the premiums of two food products that are locally manufactured was carried out. The products chosen were a piece (400 g) of natural organic tofu and a bottle (500 ml) of organic rapeseed oil manufactured in Sweden or outside of Sweden. These products were specifically chosen in order to investigate subjects' product valuations with an element of an intrinsic value to investigate the effect of "home" bias in consumer food choice. The characteristic of being locally produced entails environmental protection attribute as well as can address the safety and quality characteristic of a product and consumer trust in food manufacturers.

Valuations for these products were elicited in a crossover experimental design, that is, each participant was asked both in a WTP and a WTA frame for tofu and rapeseed oil. In total four scenarios were introduced to survey subjects where they were required to make a choice. The order of elicitation of the valuation scenarios was randomized in order to avoid order effects. (Harrison, et al., 2005). The exact wording of the valuation questions can be found in the table below.

Table 2: WTA and WTP auction

WTA elicitation	**WTP elicitation**
You receive a 400 g piece of organic natural tofu (a 500 ml bottle of rapeseed oil). The tofu (oil) is manufactured in Sweden. You can **exchange** this Swedish tofu for non-Swedish tofu (oil) and **receive some money**. If you are **not** interested in exchanging the tofu (oil), please select the first option below. If you are interested in an exchange at 20 SEK or less, please state the minimum amount you are **willing to accept** in order to exchange for the non-Swedish tofu (oil). Whether or not your offer is accepted depends on the price of the exchange. The price is based on a random draw of a number from 20 to 2. All numbers are equally likely. The price will be revealed after you made your decision. If the price is **greater than or equal** to your offer, you will exchange the tofu (oil) and **receive** the amount of the revealed price. That is, you can never receive less than what you have selected. If the price is smaller you will not exchange the tofu (oil). **Please select one of the options below.** o I am not interested in an exchange o I would like to exchange for non-Swedish tofu (oil) and receive 2 SEK at least.	You receive a 400 g piece of organic natural tofu (a 500 ml bottle of rapeseed oil). The tofu (oil) is **not** manufactured in Sweden. You can **exchange** this non-Swedish tofu (oil) for Swedish tofu (oil) and **spend some money**. If you are **not** interested in exchanging the tofu (oil), please select the first option below. If you are interested in an exchange at 2 SEK or more, please state the **maximum amount** you are **willing to pay** in order to exchange for the Swedish tofu (oil). Whether or not your offer is accepted depends on the price of the exchange. The price is based on a random draw of a number from 20 to 2. All numbers are equally likely. The price will be revealed after you made your decision. If the price is **smaller than or equal** to your offer, you will exchange the tofu (oil) and **spend** the amount of the revealed price. That is, you can never spend more than what you have selected. If the price is greater you will not exchange the tofu (oil). **Please select one of the options below.** o I am not interested in an exchange o I would like to exchange for Swedish tofu (oil) and spend 2 SEK at most.

o I would like to exchange for non-Swedish tofu (oil) and receive 4 SEK at least.	o I would like to exchange for Swedish tofu (oil) and spend 4 SEK at most.
o I would like to exchange for non-Swedish tofu (oil) and receive 6 SEK at least.	o I would like to exchange for Swedish tofu (oil) and spend 6 SEK at most.
o I would like to exchange for non-Swedish tofu (oil) and receive 8 SEK at least.	o I would like to exchange for Swedish tofu (oil) and spend 8 SEK at most.
o I would like to exchange for non-Swedish tofu (oil) and receive 10 SEK at least.	o I would like to exchange for Swedish tofu (oil) and spend 10 SEK at most.
o I would like to exchange for non-Swedish tofu (oil) and receive 12 SEK at least.	o I would like to exchange for Swedish tofu (oil) and spend 12 SEK at most.
o I would like to exchange for non-Swedish tofu (oil) and receive 14 SEK at least.	o I would like to exchange for Swedish tofu (oil) and spend 14 SEK at most.
o I would like to exchange for non-Swedish tofu (oil) and receive 16 SEK at least.	o I would like to exchange for Swedish tofu (oil) and spend 16 SEK at most.
o I would like to exchange for non-Swedish tofu (oil) and receive 18 SEK at least.	o I would like to exchange for Swedish tofu (oil) and spend 18 SEK at most.
o I would like to exchange for non-Swedish tofu (oil) and receive 20 SEK at least.	o I would like to exchange for Swedish tofu (oil) and spend 20 SEK at most.

In the survey, in the WTP frame, it was stated that subjects were provided with a piece of natural organic tofu (bottle of organic rapeseed oil) manufactured outside of Sweden, which they can exchange for a piece of natural organic tofu (bottle of organic rapeseed oil) manufactured in Sweden and spend some money. Then participants were asked whether they are interested in the exchange and if they are what is the maximum amount they are willing to pay for the exchange of products. In the WTA frame, it was stated that subjects were provided with a piece of natural organic tofu/bottle of organic rapeseed oil manufactured in Sweden and that they can exchange the product to the one that is manufactured outside of Sweden and receive some money. If interested, they required to state the minimum amount they are willing to accept for the product exchange, otherwise choose the option specifying that they are not interested.

The payment card (PC) elicitation format which identifies the upper and lower bounds of individual WTA and WTP has been chosen for the analysis. Here, each respondent was asked to choose the one value from the given options which represents the WTA or WTP values. This format has been widely used in the valuation literature and it is one of the most common formats for CV studies. PC elicitation exhibits desirable properties that resemble every-day consumer behavior. Individuals when making a food choice observe different values of the product of interest and choose the one that suits them most. The validity of the instrument is increased by the fact that the cognitive demand is potentially mitigated (Donaldson, et al., 1997).

Both WTA and WTP were elicited over the same payment card. That is, every subject was given a list of monotonically increasing amounts of money to choose from, ranging from 2 SEK to 20 SEK in 2 SEK intervals including an option where s/he could choose to not exchange the given product. The no-choice/no-interest option was included in order to get a more realistic purchase situation and as a result increase the validity of the data (Hensher, 2010).

Respondents were also informed that at the specified pick-up date of the ICA vouchers, every sixth participant's decisions were binding and there is an opportunity to participate in actual product exchange. In that case, first, one of the scenarios was randomly chosen. Then, a random price of exchange will be drawn. Depending on the scenario, if randomly drawn price is smaller (greater) than or equal to the decision made by the participant, s/he exchanged the product and spend (receive) the amount of the revealed price. The experimental sequence is illustrated in Figure 2 below.

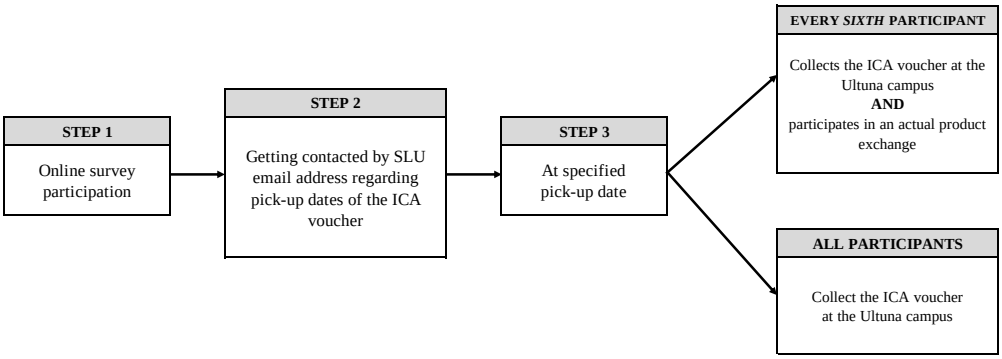

Figure 2: Experimental sequence

The post-auction questionnaire alongside standard demographic information such as age, gender, education level, questions that aimed to elicit subjects' price sensitivity and normative motivations were asked. Respondents were to state on a seven-point Likert scale how much they associate several food products with being Swedish, anchored by not Swedish at all to very Swedish. Research participants were also asked to indicate their level of agreement to different statements on a five-point Likert scale anchored by totally agree to totally disagree. Here, statements regarding trust to the government agencies responsible for food safety, sustainable consumption habits as well as whether subjects buy local or non-local food products were introduced. In addition, questions regarding diet, tofu and rapeseed oil consumption frequencies and frequencies of doing grocery shopping were asked.

5.2.2. Hypotheses

The following hypotheses were set out in this study:

- **H_1:** *WTA is higher than WTP*

In his article, Hanemann (1991) indicated that the WTA-WTP gap depends on the substitution effects: if certain product has smaller number of substitutes, then the WTA-WTP divergence is greater. Whether substitution effects can explain the WTA-WTP gap, the following hypothesis was tested:

- **H_2:** *WTA-WTP disparity is higher for tofu than WTA-WTP for rapeseed oil*

The hypothesis is based on the assumption that while multiple substitutes of the rapeseed oil exists in the Swedish market, there are no substitutes for tofu.

5.2.3. Econometric model specification

The ordinary least square model (OLS) was used to regress the WTA-WTP disparity on identified explanatory variables to answer the research question. The model takes the form:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \gamma X_{control} + \epsilon$$

where Y is a dependent variable being WTA-WTP for either tofu or rapeseed oil. X_1 is a product characteristic of local produce and $X_{control}$ is a vector of control variables, which are age, gender, education, diet, as well as participants' attitudes and beliefs. The βs are parameters to be estimated that measure the impacts of explanatory variables, γ is a vector of parameters for the control variables and ϵ is a normally distributed error term.

5.3. Quality and security criteria

To ensure reliability of the present study, trustworthy and reliable relevant literature was used on which the study is based. The sources included published articles from scientific journals as well as textbooks in the area of behavioral and experimental economics and business administration. The accuracy of the data collected through the conducted experiments was maintained by thorough data screening in order to reveal any missing data, outliers, multicollinearity, normality and homoscedasticity impact of studied variables and other potential issues that could negatively affect empirical analysis and, if needed, were either modified or eliminated.

The data collection for the online survey was carried out using Qualtrics Online Survey service. Data were analyzed using IBM SPSS Statistics (Version 26) predictive analytics software. This software package is one of the most popular statistical packages used by researchers to execute complex data manipulation and analysis for both qualitative and quantitative studies (Field, 2018). It has great point-and-click user-friendly interface, which allowed to perform complex statistical tests and interpret the results easily.

No private information was collected and used from the first study. The second study, however, contained some private information obtained through the post-auction questionnaire. Thus, the data obtained from the second study was kept safe and secure from any unauthorized access and stored in password protected files. To further ensure data safety and prevent loss, theft or damage, back-up copies of the files were made.

5.3.1. Pre-registration

The second study was pre-registered prior to the online auction being conducted. The motivation behind the pre-registration was the recent move of individuals, scientific societies and journals to ensure study validity and promote transparency in social science research (Canavari, et al., 2018). The pre-registration was carried out on the AsPredicted platform, #55345, and a copy of pre-registration is attached in Appendix D. As it can be seen from the Appendix, the pre-registration involved specifying in detail information about main questions and hypotheses being tested, key dependent variables and their measurement, methods applied, and number of observations to be collected.

5.3.2. Survey pilot

A survey pre-test was conducted in order to determine the strengths and weaknesses of the study and test the workings of the procedure. The sample size for the pre-test was 4 individuals who were asked to provide feedback on the survey. The results of the process suggested that the amount of information for respondents was too long to keep respondents' attention as such texts and instructions were modified and reduced. Few questions in the original survey were identified as confusing and required additional explanation, so these questions were rephrased and clearly worded in order to increase their comprehension by potential respondents. Some rearrangements of the survey sequence were also needed. Overall, the pre-test yielded a concise and easy to interpret survey that was used in the actual data collection.

5.4. Ethical considerations

The research process, materials and respondents were protected in the study. The participation in the studies was voluntary and before information was elicited from respondents, an informed consent form was provided, and respondents were asked to carefully read and provide their consent before actual participation in the study. Only after agreement to the informed consent, subjects had access to the survey. The principles of strict confidentiality and anonymity were also applied.

6. Results and discussion

6.1. Study 1 – the role of information

Previous choice experiments mainly looked at the role of information of the same type of product. The current study investigated shifts from a typical conventional product towards a more healthy and environmentally friendly alternative.

6.2. Descriptive analysis

A total of 286 pupils participated in the experiment with 90 percent of the participants from 10 to 13 years of age (M = 11.58, SD = 1.41). Girls accounted for 44.1 percent of the sample and boys were represented by 52.4 percent, the rest of the pupils either didn't answer the question or preferred not to say their gender. As for the diet, the majority of the participants described their diet as flexible (85.3 percent), 6.3 percent stated that they are vegetarians and only one participant identified the diet to be vegan, the rest of the respondents either chose other or did not answer the question.

Table 3: Field experiment descriptive statistics

Variable	Number	Percentage	Mean	Median	Mode	Std. Deviation
Gender						
Female	126	44.06				
Male	150	52.45				
Other	10	3.50				
Age	277	96.9	11.58	11.0	11.0	1.41
Est. cost of Edamame beans	277	96.9	22.00	20.00	20.0	8.30
Est. cost of salted sticks	281	98.3	20.45	20.00	20.0	7.53
Costs difference	278	97.2	1.53	1.00	10.00	9.39
Costs ratio	278	97.2	1.19	1.05	1.00	0.63

6.3. Econometric analysis

The results showed that majority of children that participated in the study preferred to choose conventional snack that they were more familiar with rather than its environmentally friendly alternative (please refer to Figure 3).

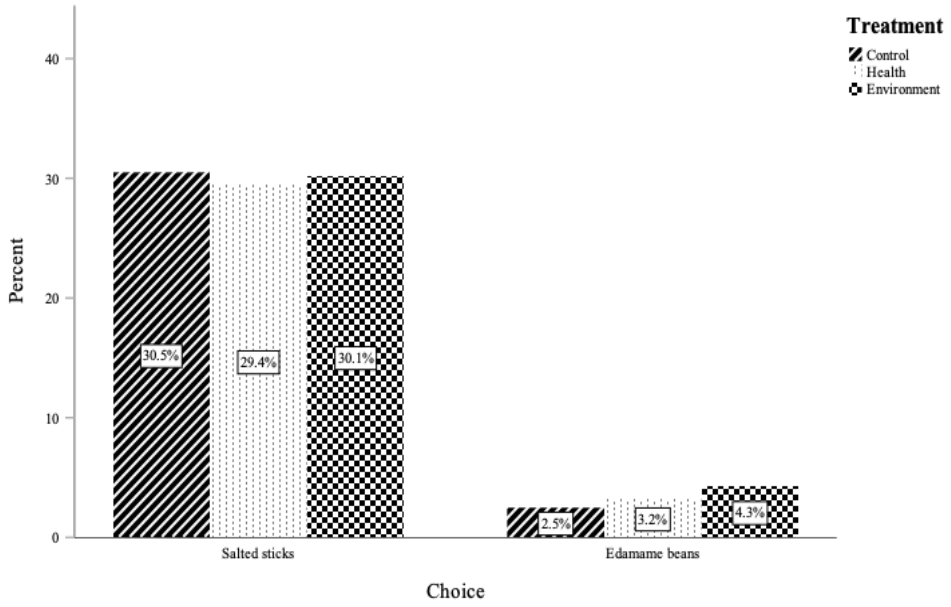

Figure 3: Distribution of responses of the choice experiment

Providing that the dependent variable is binary, and the analysis of the collected data showed that the distributions of dependent and independent variables were not normal, the non-parametric post hoc tests, applying the Kruskal-Wallis H test was performed in order to test the significance of the difference of choices within three treatment groups. This non-parametric test is commonly used to determine if there are statistically significant differences of medians between the given groups of an independent variables on binary dependent variable. The test statistic used in the Kruskal-Wallis H test is called the H statistic. The null hypothesis is that population medians are equal, while alternative hypothesis is that population medians are not equal. The test result shown in the Table 3 revealed that the difference between respondents' choices within three treatment groups is not significantly different from each other ($p > 0.05$) implying that there was no effect of different treatments on the children's choice of snack (they mostly chose salted sticks).

Table 4: Kruskal-Wallis H test

	Choice
Kruskal-Wallis H test	1.245
df	2
Asymptotic significance	0.537

Before proceeding to the results of the logit regression, the evaluation of the full-model fit was conducted by using the results of the Hosmer-Lemeshow test (Hosmer, et al., 2013). It is a statistical goodness of fit test used for logit regressions.

The test allows to determine whether differences between observed and expected proportions are insignificant, which indicates logit regression model's lack of fit. As the result for the test is not significant ($p > 0.05$), the null hypothesis is rejected implying that there isn't enough evidence to state that the model is a poor fit (Hosmer, et al., 2013).

Table 5: Hosmer-Lemeshow test

Chi-square	df	Significance
6.742	8	.565

The results of the logistic regression analysis showed significant results for the gender dummy variable that compares females and males (please refer to Table 6). The positive coefficient suggests that females are more likely to choose Edamame beans snack than males (coefficient = 3.332, S.E. = 1.467, $p < 0.05$). The odds ratio indicates that the odds of choosing Edamame beans increases by a factor of 28.006, meaning that there is an increasing probability of the odds of females to the choice of environmentally friendly snack. The provision of different information treatments as well as age, diet and price beliefs did not affect choices of respondents.

Table 6: Results of the logit model estimation

						95% confidence interval for the odds ratio	
Variable	**Coefficient**	**Wald**	**df**	**Significance**	**Odds ratio**	**Lower**	**Upper**
Treatment		0.923	2	0.630			
Treatment (1)	0.223 (0.572)	0.151	1	0.697	1.249	0.407	3.834
Treatment (2)	0.522 (0.554)	0.887	1	0.346	1.685	0.569	4.988
Gender		5.323	2	0.070			
Gender (1)	0.353 (0.452)	0.611	1	0.434	1.424	0.587	3.454
Gender (2)	3.332 (1.467)	5.162	1	0.023	28.006	1.580	496.337
Age	0.085 (0.128)	0.438	1	0.508	1.089	0.847	1.400
Diet		0.932	3	0.818			
Diet (1)	-0.010 (0.812)	0.000	1	0.990	0.990	0.202	4.858
Diet (2)	-18.612 (40192.970)	0.000	1	1.000	0.000	0.000	
Diet (3)	-1.181 (1.225)	0.929	1	0.335	0.307	0.028	3.390
Est. cost of Edamame beans	0.010 (0.037)	0.079	1	0.778	1.010	0.940	1.086
Est. cost of salted sticks	-0.024 (0.049)	0.231	1	0.631	0.977	0.887	1.075
Costs ratio	0.300 (0.409)	0.538	1	0.463	1.350	0.606	3.007
Constant	-3.873 (2.029)	3.642	1	0.056	0.021		

Notes: standard errors are displayed in parentheses. Numbers in parentheses after variable's name indicate dummy variables for each level.

The field study participants were also asked how much (in SEK) they think the two snacks cost in a supermarket. Interestingly, independent of the treatment, the

majority of the respondents indicated higher price for the Edamame beans than for the salted sticks. Across the three treatment groups the children on average assumed that the price of Edamame beans is 7.6 percent higher than the price of salted sticks. This can indicate that children assumed higher value of the Edamame beans compared to the value of the familiar salted sticks snack independent of whether or not they were introduced to the health or environmental benefits of the climate friendly snack. The average estimated costs in a supermarket of both Edamame beans and salted sticks stated by the experiment participants is shown in Figure 4.

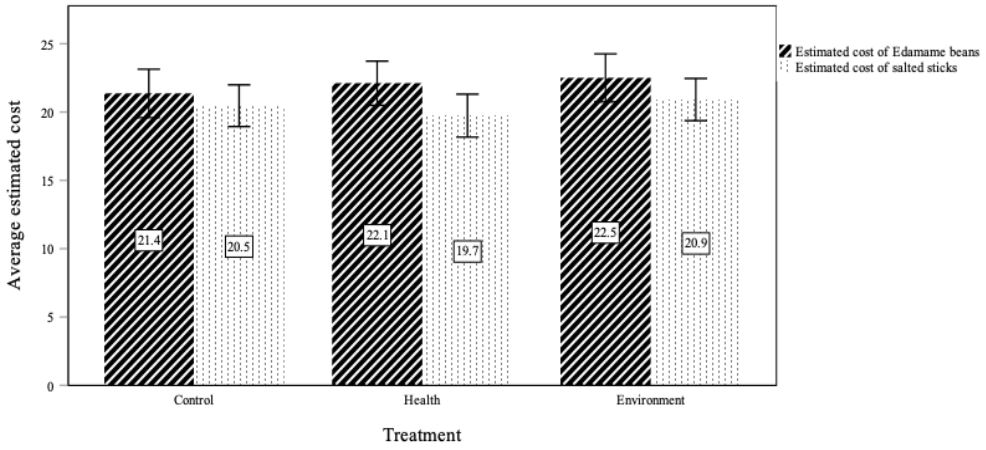

Figure 4: Average estimated cost of snacks across treatment groups

To test whether the results of the estimated costs for both snacks is different across the treatment groups, the Kruskal-Wallis H test was applied. In addition to the estimated costs, the difference between costs and costs ratio was also included in the test. The results provided in Table 7 showed no significant results, indicating that the medians of the children's price beliefs, difference of the price beliefs and their ratio for two snacks are equal across all three treatment groups.

Table 7: Kruskal-Wallis H test for price beliefs

	Est. cost of Edamame beans	Est. cost of salted sticks	Costs difference	Costs ratio
Kruskal-Wallis H test	1.917	1.632	1.404	2.705
df	2	2	2	2
Asymptotic significance	.383	.442	.496	.259

It is now possible to examine the two primary hypotheses set before the study. First, the **H_1** implied that information about health or environmental benefits attributes of an environmentally friendly product, introduced by the Edamame beans snack, shift consumer choices towards this product. The revealed findings on the choice experiment conducted among children do not support the stated hypothesis. The results show that it is hard to convince children to try a novel product that they are not familiar with. Regardless of whether subjects obtained information about health or environmental benefits of the Edamame beans snack, they opted to the familiar snack and chose salted sticks.

On the other hand, the econometric analysis of children's price beliefs of the legume-based snack revealed that children stated considerably higher prices for the Edamame beans snack as compared to the conventional snack, which is in line with **H_2** stating that price beliefs are higher for products with health and environmental benefits attributes than for conventional alternatives. Yet it is hard to say whether the product's attributes influenced children's estimated costs in a supermarket of the legume-based snack due to the fact, that those in the control group that did not obtain any information about health and environmental benefits of the Edamame beans also provided higher prices than for the familiar conventional snack.

Given the price beliefs results, there is a potential, however, for companies to reach younger consumers via raising the awareness about environmental and health benefits of novel protein food products. In order to achieve consumer acceptance and adoption of novel protein sources, clear, non-technical communication to consumers about food production and nutritional information is needed. In terms of the policy recommendations, for information to be effective in changing behavior and promoting sustainable consumption that implies adjustment of diets, there is a need to convey important aspects of food attributes in simple messages that would appeal to the food culture and preferences of target consumers. Simple guideline-provision for sustainable food consumption in form of action knowledge-provision could be one of the policy intervention tools aimed to promote consumers' ability to identify climate friendly food products and increase their motivation to try and familiarize themselves with healthier and environmentally friendlier alternatives.

6.4. Study 2 – the role of behavioral biases

6.4.1. Descriptive analysis

The sample included 61 participants from SLU (70.5 percent females and 27.9 percent males) aged between 19 and 52 years old (M = 26.49, SD = 7.07). almost 64 percent of respondents identified themselves as grown up mostly in Sweden, while the rest of subjects have lived in Sweden for less than 5 years. More than half of the sample (54.1 percent) indicated their education level as BSc or equivalent and the rest (45.9 percent) had a MSc or equivalent.

Most participants identified themselves as flexitarians (49.2 percent), whereas 24.6 percent stated that they regularly eat meat and/or fish, 16.4 percent were vegetarians and 9.8 percent followed vegan diet (please refer to Table 8). The majority of the participants are regular grocery shoppers. 67.2 percent of the sample stated that they do grocery shopping 1-3 times per week, 22.9 percent do shop less than once per week, while 9.84 percent do shop more than 3 times per week. Moreover, 63.8 percent stated that they consume rapeseed oil a couple of times per month while around 34.7 percent of respondents chose the same frequency response for tofu. Almost 45 percent of survey participants indicated that they consume tofu only a couple of times per year.

Table 8: sample socio-demographic characteristics (n=61)

Demographic	**Number**	**Percentage**
Gender		
Female	43	70.5
Male	17	27.9
Other/prefer not to say	1	1.6
Education	61	
BSc or equivalent	33	54.1
MSc or equivalent	28	45.9
Country of origin		
Grew up mostly in Sweden	39	63.9
Lived in Sweden for < 5 years	22	36.1
Diet		
Regularly eat meat/fish	15	24.6
Flexitarian	30	49.2
Vegetarian	10	16.4
Vegan	6	9.8
Frequency of tofu consumption		
Never or almost never	10	16.4
A couple of times per month	17	27.9
A couple of times per year	22	36.1
Frequency of rapeseed oil consumption		
Never or almost never	4	6.6
A couple of times per month	37	60.7
A couple of times per year	17	27.9
Frequency of grocery shopping		
Less than once per week	14	23.0
1-3 times per week	41	67.2
More than 3 times per week	6	9.8

Upon examining results of lifestyle variables, opinions regarding environmental aspect of food consumption, statements regarding trust in government agencies responsible for food safety and food choice habits (please refer to Table 9), it may be noted that over 30 precent of respondents associate food products of organic produce to be more environmentally friendly as compared to conventional food. Interestingly, the same percentage of participants also stated neutral opinion regarding the statement. Moreover, it can be suggested that respondents practice more or less sustainable consumption behavior as on average more than 40 percent of respondents agreed to the statement that they often try to limit the environmental impact of their consumption decisions.

In terms of the trust to the governmental agencies responsible for food safety in the EU, only around 21 percent of responses were chosen as "Strongly agree", while 44 percent agreed to the statement partially and nearly 30 percent were at neutral position regarding the statement. However, in contrast, 49 percent of participants strongly agreed to the statement that they trust governmental agencies responsible for food safety in Sweden, 36 percent agreed partially and approximately 12 percent chose the neutral option. This can indicate that subjects trust Sweden food safety authorities more than EU safety authorities.

As for the food choices, more than 65 percent of survey respondents agreed (strongly and partially) to the statement that they often try to buy local food. The health benefits characteristic is important for roughly 85 percent of the subjects, while at the same time the price of product also plays a significant role. Almost 70 percent of respondents stated that they either strongly agree or somewhat agree to the statement regarding price sensitivity during food purchase decision. Only 15 percent of responses showed that the subjects somewhat disagree with the statement. At the same time, the analysis of the collected data showed that majority of participants prefer to buy Swedish food, which is in line with the statement regarding local food products purchase behavior. Although approximately 16 percent of respondents indicated neutral opinion whether they often try to buy environmentally friendly food, nearly 79 percent of them agreed with the statement.

Table 9: Respondents' opinions, attitudes and lifestyle characteristics

Statement	**1 "Strongly agree" (%)**	**2 "Somewhat agree" (%)**	**3 "Neither agree nor disagree" (%)**	**4 "Somewhat disagree" (%)**	**5 "Strongly disagree" (%)**	**Mean**	**S.D.**
The environmental impact of organic food is smaller than the impact of conventional food.	31.1	29.5	31.1	6.6	1.6	2.18	1.01
I often try to limit the environmental impact of my consumption decisions.	39.3	45.9	9.8	4.9	-	1.80	0.81

I trust the government agencies responsible for food safety in the EU.	21.3	44.3	29.5	3.3	1.6	2.20	0.87
I trust the government agencies responsible for food safety in Sweden.	49.2	36.1	11.5	3.3	-	1.69	0.81
I often try to buy local food.	23.0	42.6	24.6	9.8	-	2.21	0.91
I often try to buy healthy food.	41.0	44.3	11.5	1.6	1.6	1.79	0.84
I often try to buy food at lower prices.	32.8	37.7	14.8	14.8	-	2.11	1.03
I buy Swedish food as much as possible.	37.7	42.6	9.8	9.8	-	1.92	0.94
I often try to buy environmentally friendly food.	37.7	41.0	16.4	4.9	-	1.89	0.86

6.4.2. Econometric analysis

Before analysis of the "home" bias reflected in the respondents' WTA and WTP measures, it was interesting to determine how much the subjects were WTP for the product attribute of being locally produced. As Table 10 displays, on average, survey respondents in the tofu scenario were WTP 6.5 SEK more in order to exchange the piece of tofu that was manufactured outside of Sweden to the one that is locally manufactured. In the rapeseed oil scenario, the respondents stated on average that they were WTP almost 8.5 SEK more to exchange the bottle of rapeseed oil of non-local produce in favor of locally produced rapeseed oil.

Table 10: Descriptive statistics of respondents WTA and WTP for tofu and rapeseed oil

Variable	**N**	**Mean**	**Median**	**Mode**	**S.D.**	**Skewness**	**Kurtosis**
Tofu WTA	61	16.30	20.00	20	5.560	-1.192	0.026
Tofu WTP	61	6.52	6.00	0	5.632	0.371	-0.746
Rapeseed oil WTA	61	16.59	20.00	20	5.661	-1.396	0.571
Rapeseed oil WTP	61	8.46	8.00	10	5.790	0.130	-0.553
WTA-WTP gap for tofu	61	9.77	10.00	10	6.230	0.035	-0.712
WTA-WTP gap for rapeseed oil	61	8.13	8.00	10	6.428	-0.117	0.563

Given that WTP measures are non-normally distributed, to check whether the stated preferences for two products differ from each other, the non-parametric Wilcoxon signed rank test was applied instead of the parametric t-test which requires normally

distributed data (Capanu, et al., 2006). The null hypothesis of the test is that the median of differences between WTP measures for tofu and rapeseed oil equals zero. As the Table 11 shows, the median of differences of WTP estimates for the two products are significantly different at 5 percent significance.

Table 11: The Wilcoxon signed rank test results for WTP estimates

Null hypothesis	N	Test statistic	Standard error	Standardized test statistic	Significance
The median of differences between tofu WTP and rapeseed oil WTP equals zero	61	600.500	70.994	2.965	0.003

Before proceeding to the analysis of the subjects' identified WTA and WTP for two different products and consequently the WTA-WTP disparity, it is important to note how responses of no interest in the exchange were treated. In the WTA elicitation format, all the responses where subjects stated no interest in the exchange, the maximum amount of 20 SEK was considered in the analysis. It is assumed that whenever a respondent stated no interest in the product exchange, it could mean that s/he puts even higher values on the product and requires higher amount of money for the exchange. Yet, given that the maximum amount in the survey is 20 SEK, this amount was used in the analysis as the minimum amount respondents are WTA for the product manufactured outside of Sweden.

As for the WTP elicitation format, whenever subjects chose the option with no interest in the exchange, the value of zero was used in the analysis, providing that respondents did not want to exchange the product for the one that is manufactured in Sweden and thus did not want to pay any amount for it.

Given that the data for both WTA and WTP amounts is not normally distributed, the non-parametric Wilcoxon signed ranks test was used to explore whether the WTA-WTP disparity exists. The results of the Wilcoxon signed ranks test (please refer to Table 12) showed significant results. This implies that the median differences between WTA for both tofu and rapeseed oil and WTP are not equal, WTA-WTP gap exists for both products, which is in line with the reviewed academic literature.

The results in turn are clearly in line with the results of previously conducted research on behavioral biases and how they affect WTA-WTP disparity. The **H_1**: *WTA is higher than WTP* set out before the study is therefore accepted. The comparison of the disparities between the products also show the median differences between WTA-WTP gap for tofu and WTA-WTP gap for rapeseed oil. The WTA-WTP divergence is larger for tofu than for rapeseed oil. This can indicate that substitution effects influence the divergence, and it is greater for the tofu product that has no substitutes in the market than rapeseed oil with numerous available alternatives, which is in line with (Hanemann, 1991; Shogren, et al., 1994). Thus, the **H_2** that indicated that the disparity is higher for tofu than for rapeseed oil is confirmed by the econometric estimates.

Table 12:The Wilcoxon signed rank test results for WTA-WTP disparities for two products

Null hypothesis	N	Test statistic	SE	Standardized test statistic	Sig.
The median of differences between tofu WTP and WTA equals zero.	61	1591.000	122.324	6.483	0.000
The median of differences between rapeseed oil WTP and WTA equals zero.	61	1495.500	119.029	6.095	0.000
The median of differences between tofu WTA-WTP disparity and rapeseed oil WTA-WTP disparity equals zero.	61	300.500	82.376	-2.094	0.036

In order to identify the socio-demographic characteristics that affect WTA-WTP disparities across tofu and rapeseed oil products, OLS regression analysis was implemented. First, the effect of socio-demographic characteristics of respondents on WTA-WTP disparity for tofu and rapeseed oil was analyzed. The results of the regressions for two products are displayed in Table 13.

Table 13: Results of OLS regression of socio-demographic characteristics' effects

				95.0% Confidence Interval	
	Coefficient	**t - statistic**	**Significance**	**Lower bound**	**Upper bound**
Results for tofu					
Constant	2.209 (5.381)	0.411	0.684	-8.658	13.076
Gender	0.098 (1.888)	0.052	0.959	-3.716	3.911
Age	0.166 (0.138)	1.202	0.236	-0.113	0.446
Education	2.773 (2.958)	0.937	0.354	-3.202	8.748
Diet	0.225 (0.976)	0.230	0.819	-1.747	2.196
Country of origin	-1.397 (1.418)	-0.985	0.330	-4.261	1.467
Results for rapeseed oil					
Constant	7.207 (6451)	1.117	0.270	-5.820	20.234
Gender	-1.916 (2.264)	-0.847	0.402	-6.488	2.655
Age	0.056 (0.166)	0.336	0.738	-0.279	0.391
Education	2.342 (3.547)	0.660	0.513	-4.821	9.505
Diet	0.626 (1.171)	0.534	0.596	-1.738	2.990

Country of origin	-1.965 (1.700)	-0.247	0.806	-3.066	2.399

Notes: standard errors are displayed in parentheses.

As the table displays, no significant linear relationship between WTA-WTP disparity for both tofu and rapeseed oil products and socio-demographic characteristics of the respondents was found by the model estimation.

Table 14: Results of OLS regression of attitudes, opinions and lifestyle effects

				95.0% Confidence Interval	
	Coefficient	**t - statistic**	**Significance**	**Lower bound**	**Upper bound**
Results for tofu					
Constant	9.871 (4.212)	2.343	0.023	1.414	18.327
The environmental impact of organic food is smaller than the impact of conventional food.	0.459 (0.866)	0.530	0.598	-1.279	2.197
I often try to limit the environmental impact of my consumption decisions.	-0.142 (1.375)	-0.103	0.918	-2.902	2.618
I trust the government agencies responsible for food safety in the EU.	-0.529 (1.210)	-0.437	0.664	-2.959	1.901
I trust the government agencies responsible for food safety in Sweden.	1.426 (1.273)	1.120	0.268	-1.129	3.980
I often try to buy local food.	2.998 (1.118)	2.683	0.010	0.755	5.242
I often try to buy healthy food.	0.430 (1.028)	0.418	0.677	-1.634	2.494
I often try to buy food at lower prices.	-0.966 (0.809)	-1.194	0.238	-2.590	0.658
I buy Swedish food as much as possible.	-0.409 (1.115)	-0.367	0.715	-2.647	1.829
I often try to buy environmentally friendly food.	-3.536 (1.464)	-2.416	0.019	-6.474	-0.597
Results for rapeseed oil					
Constant	9.624 (4.803)	2.004	0.050	-0.018	19.266
The environmental impact of organic food is smaller than the impact of conventional food.	-0.877 (0.987)	-0.889	0.378	-2.859	1.104
I often try to limit the environmental impact of my consumption decisions.	-0.555 (1.568)	-0.354	0.725	-3.702	2.593
I trust the government agencies responsible for food safety in the EU.	0.264 (1.380)	0.192	0.849	-2.506	3.035

I trust the government agencies responsible for food safety in Sweden.	0.017 (1.451)	0.011	0.991	-2.897	2.930
I often try to buy local food.	1.049 (1.274)	0.823	0.414	-1.509	3.607
I often try to buy healthy food.	1.633 (1.172)	1.393	0.170	-0.720	3.986
I often try to buy food at lower prices.	-0.305 (0.922)	-0.331	0.742	-2.157	1.547
I buy Swedish food as much as possible.	-0.653 (1.271)	-0.514	0.610	-3.205	1.899
I often try to buy environmentally friendly food.	-1.342 (1.669)	-0.804	0.425	-4.692	2.008

Notes: standard errors are displayed in parentheses.

The analysis proceeds to the examination of whether the subjects' opinions and habits could indicate any explanatory characteristic on the WTA-WTP divergence. The OLS regressions shown by Table 14 provided interesting output for the tofu product. Significant results were found by the respondents' indication of often buying behavior of local food and environmentally friendly food at 5 percent significance. This can signify that consumers that are characterized by more environmentally friendly consumption behavior, value higher the attribute of a good being locally produced than other categories of consumers. The implication here could be that there is greater potential to target such consumers in the market Other factors' results revealed statistically insignificant results for both tofu and rapeseed oil.

7. Conclusion

Dietary choices are considered to be the major global determinants of public health and environmental sustainability and can threaten the achievement of the UN's Sustainable Development Goals and the Paris Climate Agreement. The implementation of food consumption solutions to the Food-Planet-Health trilemma and encouragement of sustainable consumption towards developing environmentally friendlier society have become one of the major political, economic and sociological challenges worldwide. In order to promote healthier and more sustainable food systems, consumers around the world are encouraged to explore alternative diets and switch towards more environment-friendly protein sources. Developing climate-friendly substitutes to animal-based protein sources that consumers will accept introduces a challenge and highlights the importance of conducting studies in which researchers introduce consumers with environmentally friendly protein alternatives to the conventional products and evaluate consumers' responses (Hartmann & Siegrist, 2017).

Although health and environmental concerns are often cited by consumers as some of the main reasons that results in demand for alternative proteins, research shows that only minority of consumers are aware of and motivated by "healthiness" and "environmental friendliness" in their actual pro-environmental food choices and in the desire to reduce animal protein consumption. The present study highlighted significant gaps in the available evidence, that support the factors influencing consumer acceptance of alternative climate-friendly protein sources and it remains unclear which factors will support the transition of global market towards more sustainable food systems.

In two studies, the present work aimed to contribute to an increased understanding of how consumers make food choices and what factors affect their decision. Consumers' food choices can be affected by information and result in consumers' knowledge change, shaping their attitudes and redirecting decision making in terms of food choices and dietary behavior. Thus, the provision of information on the environmental and health aspects of alternative proteins can increase consumer acceptance of the products. The first study by the means of conducting a field choice experiment investigated whether participants provided with food-related health and environmental benefits information choose these types of products. Furthermore, the study looked into how the information provided can result in certain price beliefs of the given product, which allowed assessment of consumer product valuation estimates.

Another factor that can affect consumer choices is related to the behavioral biases in particular the "home" bias. The second study introduced a survey-experimental evaluation of the WTA-WTP gap and "home" bias using food products manufactured either in Sweden or outside of Sweden. Furthermore, the study investigated the variances between consumers based on individual latent traits and socio-demographic characteristics, in order to assess how these factors affect WTP and WTA and to outline a profile of target consumers attracted by climate-friendly products.

Both studies were conducted among younger generation of consumers motivated by the fact that food consumption behavior is affected early in life by the eating habits which shape food attitudes and eating patterns through adulthood. Thus, it was of interest to understand the role of information about product attributes and behavioral biases on food choices of younger consumers that represent key stakeholders in the conceptualization of sustainable behavior and sustainable food consumption. Three main contributions to consumer preferences research could be identified by the present study. First, the role of different types of information/knowledge in consumer food choice. Second, the paper contributes to consumer research on "novel" legume-based protein foods in European context and, in particular, the potential of organic soybean production in Sweden. Third, the WTP/WTA gap and "home" bias were analyzed on consumers' food choice decisions.

While the results of the first study revealed that it is hard to convince children to try and choose a novel climate friendly food product (Edamame beans snack) regardless of whether or not they are provided with the information about product's health or environmental benefits, the children's price beliefs indicated that there is a potential, however, for companies to reach younger consumers via raising the awareness about environmental and health benefits of novel protein food products, which can be achieved by simple guideline-provision for sustainable food consumption in form of action knowledge-provision.

The second study findings are clearly in line with the research on behavioral biases and how they affect WTA-WTP disparity subject to substitution effect. This study also examined consumers' WTP more for the product attribute being manufactured in Sweden. On average, study respondents were WTP 6.5 SEK more for the tofu that is manufactured in Sweden, which in turn could indirectly signify the potential of organic soybean production in Sweden. Moreover, the results indicate that the cost of neutralizing some fraction of negative environmental effects caused by the unsustainable food systems could possibly be recovered by charging the associated premium on market prices.

Some general recommendations can be provided for both producers and policy makers. Market agents should carefully consider the results of the present research in order to address different issues when formulating marketing strategies focused on emphasizing the sustainable attributes of the products. The policy makers could consider the study results in the design of the right policy that promotes sustainable food consumption and reflect on the educational and information campaigns that

encourage sustainable dietary patterns as well as to better define food labeling legislation.

7.1. Limitations and Future research

There are various limitations of the present research. The study applied the CV method to study consumers food preferences. However, it is generally acknowledged by the academic literature that consumers' actual behavior is inconsistent with their stated preferences and attitudes for environmental and social attributes. For the second study analyzing consumers' behavioral biases, there is a potential that survey respondents did not act truthfully or representatively. One of the issues that could affect the respondents' answers to the online survey questions is related to the social desirability bias, where subjects act in a way that satisfies social norms rather than reveal their true preferences. Thus, it would be interesting to implement inferred valuation method, which is an alternative method developed to avoid social desirability bias (Lusk & Norwood, 2009) by the means of asking a subject to predict the WTP and WTA measures of other average consumers, which in turn could reveal how valuations of a good are affected and reflected in WTA-WTP disparity.

Other limitations are related to the selected experimental design. The empirical data was obtained from respondents using convenience sampling. The study should be extended to a larger and diverse sample in order to increase the results generalizability. The cross-sectional approach of the two conducted studies provided a snapshot of the factors that could potentially influence consumers food choice behavior. The longitudinal study is suggested to assess how different factors and changes in socio-demographic characteristics of consumers could influence sustainable food purchase and consumption behavior.

While the effect of specific sustainability information such as health and environmental benefits as well as product's attribute of being locally produced was investigated in the present study, future studies could examine other information treatments such as the provision of information about animal welfare, effects of diverse labelling options and influences of peer opinions or information from reliable scientific sources. It would be of interest to extend the conducted experiments to include other participant groups than children and university students, which could provide an idea of how stable the results are across sample from different generations and ethnic groups as well as different socio-economic backgrounds.

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Appendix A: Consent form

Consent form

Activities

If you agree to be a participant in this research, we will ask you to do the following things:

a. Take part in an exercise where you will have an opportunity to choose between two snacks

b. Complete a short series of survey questions.

Compensation

We will randomly select every tenth participant (you can roll a 10-sided die) for whom the decision you can make will be implemented. If you are not selected, you do not receive anything.

Data and confidentiality

We will use the data for scientific purposes in anonymous form. We will not be able to identify you or any other participant.

Risks

There are no known risks from participation. If you are selected, make sure to study the allergy information on the package. We are not taking any responsibility for the product. You are solely responsible for what you do with the product (if you receive one).

Contact information

You may contact Jens Rommel, jens.rommel@slu.se if you have any questions.

Consent to participate

I have read and understood the above information. I have received answers to any questions I have asked. I consent to participate in this research.

Print Name of Participant:

Signature of Participant: _____ Date: _____

Appendix B: Choice experiment

	Treatments	
Control Group	**Health Benefits Info**	**Environmental Info**
In this exercise, you can choose one of two snack options. For every tenth participant we will implement the decision (by rolling a die). You can make your choice below.	In this exercise, you can choose one of two snack options. For every tenth participant we will implement the decision (by rolling a die). You can make your choice below. Edamame is produced from soybean, which is a legume crop. Legumes are a healthy alternative to animal products as a source of protein. Compared to meat, they are rich in unsaturated fats. Some studies show that replacing animal products with legume products might reduce the risk of cardiovascular diseases or diabetes.	In this exercise, you can choose one of two snack options. For every tenth participant we will implement the decision (by rolling a die). You can make your choice below. Edamame is produced from soybean, which is a legume crop. With the help of bacteria, legumes can fixate nitrogen in the soil and do not need as much mineral fertilizer as other crops. Legumes are also a "carbon-smart" protein source, as the greenhouse gas emissions per unit of protein are much lower than for protein produced from animal (e.g. cheese or meat).
  Please tick one option! O I choose “Salta Pinnar” O I choose “Edamamebönör”		

Appendix C: Choice experiment, follow-up questions

1. What is your gender?

O Female O Male O Other O Prefer not to say

2. What is your age? _____ years

3. How would you describe your diet?

O Flexible O Vegetarian O Vegan O Other, please specify _____

4. How much do you agree or disagree with the following statements?

Statement	**1 strongly disagree**	**2**	**3**	**4 neither agree or disagree**	**5**	**6**	**7 strongly agree**
Before participating, my knowledge about soybean has been good.	O	O	O	O	O	O	O
After participating, my knowledge about soybean has increased.	O	O	O	O	O	O	O

5. How much do you think would the "Edamamebönör" cost in a supermarket? _____ SEK
6. How much do you think would the "Salta Pinnar" cost in a supermarket? _____ SEK

Appendix D: Study pre-registration

ASPREDICTED

Wharton CREDIBILITY LAB
UNIVERSITY of PENNSYLVANIA

CONFIDENTIAL - FOR PEER-REVIEW ONLY

BDM Rapeseed and Tofu (#55345)

Created: 01/05/2021 07:16 AM (PT)
Shared: 02/06/2021 08:23 PM (PT)

This pre-registration is not yet public. This anonymized copy (without author names) was created by the author(s) to use during peer-review.
A non-anonymized version (containing author names) will become publicly available only if an author makes it public. Until that happens the contents of this pre-registration are confidential.

1) Have any data been collected for this study already?
No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?
We investigate the WTA-WTP gap for tradtional/domestic vs. non-traditional/new food items. The main hypothesis is that the WTA-WTP gap is larger for the domestic product.

3) Describe the key dependent variable(s) specifying how they will be measured.
WTP and WTA elicited from a payment card format

4) How many and which conditions will participants be assigned to?
We use a 2x2 full factorial experimental design, i.e., there are four conditions:

(1) WTA for downgrading from domestic rapeseed oil
(2) WTP for upgrading to domestic rapeseed oil
(3) WTA for downgrading from domestic tofu
(4) WTP for upgrading to domestic tofu

We use a crossover design. Participants are assigned to all conditions in random order.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
We calculate the WTA/WTP ratios per product within subjects (and for the first decision between subjects). We use non-parametric tests to compare the distribution of these ratios.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
No outlier exclusion

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.
We aim for at least 20 observations per between subject treatment = 80 participants. If possible we aim to collect data for up to 200 people.

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)